

# Post appendectomy small bowel obstruction

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## ABSTRACT

**Objective:** Postoperative small bowel obstruction is one of the adverse effects of appendectomy but its frequency varies from center to other. This study was conducted to determine the incidence of this complication among our patients who had appendectomy and identify the factors which may increase the risk.

**Methods:** Case notes of patients who underwent appendectomy from January 1998 to December 2003 in King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia were reviewed. Patients readmitted for adhesive small bowel obstruction were traced and their clinical data were analyzed.

**Results:** Six hundred and seven patients were eligible for the study. Six patients (1%) developed intestinal obstruction. Frequency of readmission of patients with features of intestinal obstruction ranged from 1-6 (mean of 2 times).

**Conclusion:** The incidence of small bowel obstruction after appendectomy is low. The main risk factors were reviewed and measures to avoid them were suggested.

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Appendectomy is one of the most frequently performed emergency surgery, and it is associated with various short and long-term morbidities. Postoperative small bowel obstruction is recognized as long term adverse effect of appendectomy.<sup>1</sup> The frequency of this complication is not well-known but the reported risk ranges from 0.2-10.7%.<sup>2-5</sup> The aim of this study was to determine the incidence of small bowel obstruction after appendectomy, and to identify factors which may increase the chances of developing such complication.

**Methods.** This is a retrospective study carried out at King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia. The medical records of patients who underwent appendectomy from January 1998 to December 2003 were reviewed. Only patients whose appendices were physically removed and subjected to histopathology and did not have abdominal surgery prior to appendectomy

were included. In addition, those patients who were readmitted for adhesive small bowel obstruction were traced and their clinical data were analyzed.

The appendectomy operation was carried out using either the standard or modified gridiron incision. The base of the appendix was not buried in all cases. Drain was used when the operator anticipated some intraabdominal collection. The skin was closed using interrupted prolene stitches or left open for delayed primary closure, when appropriate. The result of the histopathological examination was recorded as normal, inflamed, suppurative, perforated or other pathology. A performa was designed to record the data. The statistical analysis was carried out using the Statistical Software for Social Sciences version 9.

**Results.** Among the 852 patients reviewed, 607 patients were found to be eligible for entry in the study. Sixty-five percent of them were males and

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35% were females. The mean age of the patients was  $23 \pm 8.67$  years (range 12-60 years). Pain in the right lower quadrant was present in 557 patients (91.8%) and vomiting in 394 (64.9%). Tenderness in the right iliac fossa at presentation was found in 582 (95%) patients. The mean white blood cell count was  $13.75 \pm 4.35$  (range 2.4-25.9) while the mean body temperature was  $37.4 \pm 7^\circ\text{C}$  (range 35.9-39.9°C) (Table 1).

Six patients (1%) developed intestinal obstruction. Five out of the 6 patients were males. The average time of presentation for patients with intestinal obstruction after appendectomy was 24 weeks (Range 2-112 weeks). The frequency of readmission of patients with features of intestinal obstruction ranged from 1-6 times (mean of 2 times) (Table 1).

Regarding the results of histology, 81% of the appendices were inflamed, suppurative or perforated 7% were normal and 12% represented alternative pathology of the appendix (Table 2).

**DISCUSSION.** Mechanical intestinal obstruction remains one of the most common surgical emergencies.<sup>6</sup> There has been considerable alteration in the nature of the causes of intestinal obstruction with postoperative adhesions as the most common cause of intestinal obstruction.<sup>7</sup> In many earlier studies appendectomy has been the most common prior operation.<sup>8-11</sup>

In our study, the incidence of small bowel obstruction following appendectomy was 1% which conforms with previous reports.<sup>3,12</sup> The mean age of our patients who developed postoperative adhesions was 29 years (Table 1), which is higher as compared to the age of the total population who underwent appendectomy. It was reported that advancing age

carries a higher risk of postoperative intestinal obstruction,<sup>1,12</sup> but the number of cases in this age group are too small to validate this conclusion.

There are some controversies regarding gender as a risk factor for developing post-operative adhesions. In our patients the incidence was higher among males; on the other hand Riber et al,<sup>2</sup> found a higher incidence among females.

The interval between a patient's last surgery and initial admission for adhesion is wildly distributed.<sup>13</sup> In our study, the time of presentation ranged from 2 weeks to 2 years with a mean of 24 weeks, postoperatively. Menzies and Ellis<sup>14</sup> found that 21% of patient presented less than one month after laparotomy, compared to 5% in other series.<sup>13,15</sup>

In our study, 2 patients (33%) of those who developed intestinal obstruction had normal appendices and 4 patients had perforated appendices. This is in agreement with previous investigators who observed that the risk of bowel obstruction after removal of a normal appendix or perforated appendix is much higher.<sup>2,12,16,17</sup> The higher incidence of intestinal obstruction in patients with normal appendix may be due to the fact that finding of normal appendix triggers the search for other pathology, leading to more trauma to the serosa of the small intestine, hence increasing the chances of postoperative adhesive obstruction.

On the other hand, the degree of inflammation in case of a perforated appendix correlates to the magnitude of the healing response, leading to formation of more fibrous adhesions, which could precipitate intestinal obstruction. In support to this notion is our findings that infection and mechanical trauma constitute the most essential causes of adhesions. Some investigators<sup>18</sup> concluded that minimal invasive surgery can reduce the risk of small bowel obstruction in comparison to open

Table 1 - Shows a comparison between the total population (N=607) and the subset of patients (n=6) who developed intestinal obstruction.

Variables	Total Population N=607	Patient with intestinal obstruction
	Mean $\pm$ SD	Mean $\pm$ SD
Age (years)	$23 \pm 8.67$	$29.3 \pm 14.95$
WBC ( $10^4$ )	$13.75 \pm 4.35$	$10.5 \pm 5.4$
Temperature	$37.4 \pm .7^\circ\text{C}$	$37.1 \pm .59^\circ\text{C}$
Readmission (weeks)	-	$24 \pm 43$
WBC - white blood count		

Table 2 - The histopathology result of patients (N=607) who underwent appendectomy.

Histopathology	Patient	
	n	(%)
Normal (a)	42	(6.9)
Acutely inflamed (b)	70	(11.5)
Suppurative (c)	370	(60.9)
Perforated (d)	52	(8.5)
Others (e)	73	(12)
<b>Total</b>	<b>607</b>	<b>(100)</b>
a - Normal: No evidence of inflammation, b - Acutely inflamed: Macroscopic and microscopic evidence of inflammation, c - Suppurative/gangrenous: Macroscopically inflamed with peripapillary pus or gangrene, d - Perforated: Perforation of appendix with generalized or localized peritonitis, e - Others: Included carcinoid tumor of appendix, adenocarcinoma and endometriosis.		

appendectomy, but further observation and follow-up is needed before a reliable conclusion can be drawn regarding the place of laparoscopic appendectomy in reducing such complication.

Many recent publications have reported reduction of the formation of postoperative adhesion after an abdominal operation, with the use of different substances.<sup>19-22</sup> The use of an off-the-shelf biomaterial, which does not complicate the surgical procedure or impede healing, while controlling the formation of post-surgical adhesions, would be a significant achievement. The ideal material would be easy to use in the operating environment, biocompatible, prevents adhesion during healing, and would facilitate re-entry if required for subsequent surgery. However, all the currently available substances need further evaluation to confirm their efficiency.

In our study, 3 patients needed surgical treatment and the rest responded to conservative treatment. In adults most earlier workers agreed that the treatment is mainly conservative, in the form of intravenous fluids and nasogastric aspiration;<sup>23</sup> however, this is more interventional in the pediatric age groups.<sup>24-25</sup>

In conclusion, the incidence of small bowel obstruction in the present study is low after open appendectomy. Perforated appendix, male gender, advancing age, and negative appendectomy were suggested as the main risk factors. Sparing the peritoneum from severe infection by early appendectomy and reduction of mechanical trauma during surgery are achievable means for the reduction of postoperative adhesions. Further research on the effect of perioperative biomaterials is required.

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